

Redwood Prairies

Resource Fact Sheet



Redwood "Balds" History

Prairie and oak woodlands are a distinctive community in the mixed conifer forest of northwest California. Near the coast of Redwood National and State Parks, the oaks form narrow strips between the prairies and redwood/Douglas-fir forest. Moving inland, the oaks begin to extend up stream channels into the prairies, becoming continuous woodlands near Schoolhouse Peak at 3,097 feet.

"Balds," as they were known to early European settlers, never supported a forest cover in recent times and were much greater in size prior to 1900. Native people used these open spaces for transportation corridors. Taken over by settlers as pack trails, some became early major roads, particularly in southern Humboldt County. Finally they became major sheep and cattle ranges in the late 19th and early 20th century.

Generally above the marine layer (2,000 feet), these grass and oak covered ridgetops are oriented southeast to northwest and experience the extremes of the four seasons typical of interior locations.

Even though the prairies are exposed to lightning-caused fires, indigenous people may

have burned some prairies yearly to keep open space and to build nutrients. Frequent low intensity burns not only returned nutrients to the soil, but also were beneficial to berry species, hazelnut, and oak woodlands, reducing competition for water and nutrients. Other trees and shrubs would have normally succeeded into the prairies. These plants were all-important sources of food and basket-making materials.

Redwood Prairie Geology

Constantly exposed to the elements, ridgetop soils made up of mudstones and sandstones (Franciscan assemblage) produce a lumpy terrain that has been likened to "amphitheater-shaped relief." Large, slow-moving earthflows occur under the surface; yet soils are heavy in loam due to crops grown in the first half of the 1900s.

Among the few real survivors in these soils are the oaks. Local patchy variations in

the soil environment determine the shape and composition of oaks and other hardwoods including tanoak, chinquapin, madrone, and chaparral shrubs. Frequent low-intensity fires during historic time (2,000 to 3,000 years) allows these tolerant species to populate the open prairies, escaping



from competitors that aggressively dominate adjacent deeper nutrient rich soils. These fires eliminate most conifer seedlings and allow oaks and other species to stump sprout from root crowns. Minerals



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become more available from leaching of the charred remains after a fire. Beetles, caterpillars, and bud-infesting fungi are temporarily eliminated, and a profusion of new ground-level plants provide improved browse for wildlife.

Redwood Prairie Wildlife

Animals perceive differences between the dense forest and the open prairies in terms of food supply, nesting sites, and potential predator cover. Browsers such as black-tailed deer and Roosevelt elk thrive here. Predators are also nearby, such as mountain lion, bobcat, gray fox, coyote, (and at one time the grizzly bear). Black bears frequent the nut and berry patches and rotten logs near the forest edge.

The oaks produce a cornucopia of wildlife foods—acorns, leaves, twigs, sap, roots, and pollen—the basis of an elaborate food web. Consumed by insects, birds, and mammals, acorns are a seasonal high-energy food, rich in carbohydrates and fat. Herbivores eat the oak products; carnivores eat the herbivores.

Grasses usually provide early season nutrition while the acorns and other nut and berry crops provide nutrition well into the fall, a time when many animals need to put on winter fat. A century ago anthropologist Alfred Kroeber estimated acorns were the primary food of three-quarters of California native people. Oaks were also the sources of medicine and dyes.

The Circle—Giving Back

Some animals are beneficial to regeneration of oak



woodlands. The gray squirrel and the scrub jay cache acorns and only partially retrieve what they have saved. Acorns protected in this way have more success sprouting seeds, increasing their overall survival. Wood rats and mice build nests in and around oaks and woody debris and find ample food in the grassland environment. They in turn attract predatory birds such as hawks and owls.



Shaded pockets and northern exposures of these grasslands often provide better soils and moisture, and some protection from fire to allow trees such as madrone, big-leaf maple, and grand fir to make an appearance.

A Century of Change

The grasslands themselves have changed over the last century with the introduction of aggressive non-native annual grasses brought in by cattle and sheep from Mediterranean countries. This and the decrease in fire frequency have significantly reduced native grasses associated with the California landscape. The native grasses that can still be found are California oatgrass, California fescue, California brome, blue wild rye, Idaho fescue, and red fescue.

The parks' goal for the “balds” is to maintain the diversity of plants and animals that prevailed when the area was first visited by Europeans. This plan proposes a mix of management strategies: resource protection, restoring fire through prescribed burning, manually removing Douglas-fir, and reseedling and replanting with native species.

Redwood Prairies – Site Locations

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GANS PRAIRIE:

Five miles up Bald Hills Road from Highway 101. This area is an excellent example of disappearing coastal grassland due to a century of fire suppression. Perhaps one-tenth of its original size, a Douglas-fir forest has encroached upon it. The prairie contains large “wolf trees”, solitary trees growing in open grassland. There is no safe parking (roadside for individual autos only). No restrooms or picnic tables.

ELK CAMP PRAIRIE:

Ten miles up Bald Hills Road from Highway 101. A good place to note the encroachment of young Douglas-firs onto the grassland (from decades of fire suppression) and to observe behavior of the Roosevelt elk. Limited parking on north side of the road and at Lane Ranch. The old sheep barn below the residence dates back to the 1880s and has mortise and tenon construction. No restrooms or picnic tables.

DOLASON PRAIRIE TRAILHEAD:

Fourteen miles up Bald Hills Road from Highway 101. Observe Douglas-fir encroachment onto grasslands. Trailhead to Dolason Prairie, Emerald Ridge, and the Tall Trees Grove. There is an historic sheep barn two miles down the trail. Vistas, restrooms, picnic tables, bus parking.

AIRSTRIP PRAIRIE:

Sixteen miles up Bald Hills Road from Highway 101. There are pockets of fir and maple on the north slope. It is possible to find native California oat grass in the area. Old Bald Hills wagon road is visible on north slope. Vistas, limited parking.

CHILDS HILL PRAIRIE:

Seventeen miles up Bald Hills Road from Highway 101. There are broad vistas of the Redwood Creek watershed, Schoolhouse Peak, and the oak woodlands. It is possible to find native grasses in this area. An old stage stop (Tomlinson Ranch, on private property) is on north slope. Limited parking, no restrooms.

SCHOOLHOUSE PEAK:

Nineteen miles up Bald Hills Road from Highway 101. There are examples of prairie/oak woodland here. Parking and trailhead for Lyon’s Ranch. It is also possible to walk to Schoolhouse Peak lookout. Highest elevation in the park at 3,097 feet above sea level. No restrooms or picnic tables.



Redwood Prairies – Plants and Animals

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Over 30 species of birds consume acorns, but only two species play an active role in range expansion of oaks in the parks: scrub and Steller's jays. Both species cache acorns in the ground.

As many as 5,000 insect species may be associated with California oaks.

Sucking insects, moths and butterflies, beetles, wasps, and bees are the four largest associated orders. Gall wasps have the largest number of associated species.

Virtually every part of an oak is food for one or more species of insect.

Common Name

Scientific Name

Grasses

- California brome
- ❖ California fescue
- ❖ California oatgrass
- ❖ Blue wild rye
- ❖ Idaho fescue
- ❖ Red fescue

Bromus carinatus
Festuca californica
Danthonia californica
Elymus glaucus
Festuca idahoensis
Festuca rubra

Mammals

- Black bear
- Black-tailed deer
- Bobcat
- California gray squirrel
- Chickaree
- Dusty-footed wood rat
- Mountain lion
- Roosevelt elk

Ursus americanus
Odocoileus hemionus
Lynx rufus
Sciurus griseus
Tamiasciurus douglasii
Neotoma fuscipes
Puma concolor
Cervus elaphus roosevelti

Birds

- ❖ Acorn woodpecker
- American kestrel
- California quail
- Red-tailed hawk
- Scrub jay
- Steller's jay
- Western meadowlark

Melanerpes formicivorus
Falco sparverius
Callipepla californica
Buteo jamaicensis
Aphelocoma coerulescens
Cyanocitta stelleri
Sturnella neglecta

Reptiles

- ❖ California kingsnake
- ❖ Northern alligator lizard
- ❖ Northwestern ringneck snake
- ❖ Pacific gopher snake
- ❖ Western fence lizard

Lampropeltis getulus
Elgaria coerulea
Diadophis punctatus occidentalis
Pituophis melanoleucus catenifer
Sceloporus occidentalis

Amphibians

- ❖ Arboreal salamander
- Pacific tree frog

Aneides lugubris
Pseudacris regilla

- ❖ Indicator species - species more commonly associated with a certain habitat.

Redwood Prairies – Vocabulary

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Bald

historic term for prairie and oak woodlands in northwest California

Chapparal

vegetation type of low shrubby plants subject to relatively frequent fire, e.g. manzanita

Chinquapin

a relative of the tanoak with a chestnut-like seed burr

Galls

an abnormal proliferation of plant cells caused by some outside source, e.g. insect or fungi parasites

Grassland

an area not favoring forest cover due to soil and exposure conditions dominated by grass species

Hardwood

any wood of a broadleaf angiosperm, e.g. oaks, maples

Low-intensity
fire

slow moving ground fire under influence of weather conditions that consumes ground fuels and causes minimal disturbance

Madrone

hardwood species, in the heath family, found in oak-woodlands and mixed conifer forest

Non-native

introduced plant species that adapt well to new environments

Oak woodland

vegetation type characterized by an overstory of oak trees and an understory of shrub vegetation. The overstory trees can be pure oak stands (isolated trees) or woodland (less than 30 percent cover); or the overstory can be of mixed hardwood and/or coniferous trees but with oak the dominant tree.

Prairie

a large area of flat or rolling grassland

Root crowns

where the root meets the stem or trunk of a plant

Softwood

the wood of any gymnosperm needle-bearing tree, e.g. pines, firs

Serpentine

mineral composed mainly of hydrated magnesium silicate—green, brown, or yellow; the California state rock

Stump sprout

plants that sprout from buds above the roots after injury or fire

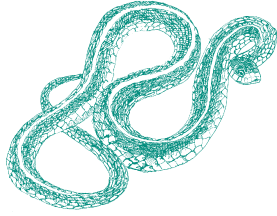
Tanoak

hardwood, not a true oak, very high in tannic acid



Redwood Prairies – References

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Prescribed fire
in the prairies



Redwood Forest

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Redwood Forest Geography

Coast redwood forests occur primarily on moist, well-drained river alluvials and Franciscan sedimentary soils that are found in coastal northern and central California. This confines the range of coast redwoods to a 450-mile corridor from southern Monterey County north to the Chetco and Winchuck Rivers in extreme southwest Oregon, an area covering approximately two million acres. The belt averages 35 miles wide, but is 45 miles at its widest, and even includes breaks (locations without redwoods) from southern Humboldt County to Monterey County. The forests thrive at under 3,000 feet in elevation, as coast redwood cannot tolerate harsh climate extremes associated with elevation. The moist marine layer generally occurs below 2,500.

Exposed ridgetops and headlands are usually devoid of redwoods, as well as the area about one quarter mile from the beach, because redwoods are not tolerant of excessive salt or wind. Sitka spruce, alder, and willow are more tolerant and are usually found in its place. Some soils, such as on ridgetop prairies, may be high in magnesium and may not favor redwoods. Redwoods can be found wandering up river valleys and in isolated stands some distance inland due to local favorable conditions and

available water, such as upper portions of the Smith River.

Redwood Forest Climate

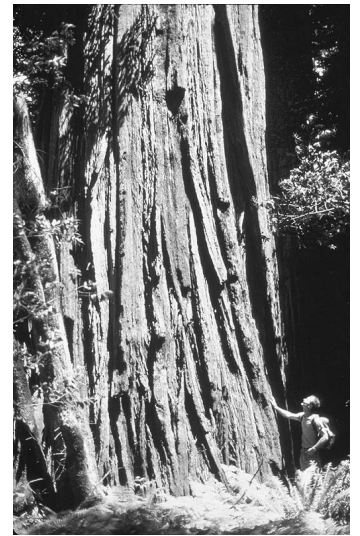
Rainfall varies from 25 inches in the driest coastal canyons in the southern portions of the range to well over 100 inches in Mendocino, Humboldt, and Del Norte counties. Still, there are wide variations throughout the range due to latitude and topography with the marine influence through coastal and river valleys. Redwoods straddle the transition from

marine-west coast climate in the northern counties to California Mediterranean climate of central California.

Summers are dry and warm, much like the rest of California, but winters cool and wet, more like the Pacific Northwest. Snow and subfreezing temperatures are uncommon except over the higher terrain.

Redwoods flourish in temperatures that rarely go below 35 degrees Fahrenheit or above 70 degrees Fahrenheit, with moderate to high humidity most of the year. Redwoods found on the edge of extremes

need these elements to survive: north slope exposure, seasonal rainfall, and available ground water. Fog is said to play a critical role in where redwoods are found. Fog is a characteristic of the local marine influence, and like the cool, humid, marine air, retards or briefly reverses moisture lost during the dry summer months. Precipitation is primarily a winter event, with fog contributing perhaps one quarter of an inch or less to the total rainfall budget.



A Relic Forest

Redwoods have an extended family history recorded in fossils dating back 200 million years to the Jurassic Period. Prior to the glaciers of two million years ago, redwoods were the most common forest trees in the Northern Hemisphere (as many as 13 species). Today, three species remain—dawn redwood (China), giant sequoia (Sierra Nevada), and coast



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redwood (northern California). Researchers divide coast redwoods into three subregional types, each with its own subtle characteristics: Monterey to Alameda County, Marin County to southern Humboldt, and southern Humboldt County to the northern forest from southwest Oregon. The northern range is ecologically similar to the temperate rain forests of Oregon and Washington, with western hemlock, western red cedar, Port Orford cedar, grand fir, and Sitka spruce. Douglas-fir and tanoak are found on drier slopes.

The Secret to a Long Life

The average age for an old-growth tree is roughly 500 to 700 years. Adaptation is key to redwood survival. Burls, clusters of buds that spontaneously begin to grow from changes or injury to the tree, are a major way redwoods regenerate themselves without the use of seeds. Redwood seeds have very low viability—only five to seven percent of seeds produced in any given year. Soil moisture and temperature are critical to germination but not consistently reliable so coast redwoods have devised this extraordinary survival strategy. Most burls occur low on the trunk, above the roots, but in mature trees many are found anywhere on the stem. Whether on the ground, charred by fire and still standing, or cut off at

the stump, burl sprouts will eventually continue the life of most coast redwoods (*Sequoia sempervirens*).

Bark is another key to redwood survival. Older trees possess up to a foot-thick insulating layer of bark that is fire resistant, protecting the cambium layer from prolonged heat exposure during fires. Bark also contains protective tannins. Fire frequency in the redwood region varies from 6 to 600 years, even over short distances, perhaps due to the marine influence. Most old trees show evidence of past fire.

Redwood leaf structure is distinctive and follows two extremes. Needles high in the exposed crown of older trees are small and resemble tight, thick juniper foliage, which helps reduce water loss. Needles in the sheltered lower portions of the tree are broad and linear with much more surface area for absorbing sun and moisture.

The tannin in redwoods colors the heartwood and bark red, protects this species from most insects and diseases, and gives redwood its longevity. Redwood tannin lacks the volatile resins found in other conifer sap. Comprised largely of water, it may help provide some fire resistance. Redwoods transpire huge amounts of water

into the atmosphere, and may reverse that process during prolonged drought periods.

Special Characteristics

Old-growth redwood forest ecosystems are dominated by trees that range in age from over 250 to beyond 1,000 years old. While the average age of the redwood tree is 500 to 700 years old, the forest is a mixture of old trees and younger trees that sprout in places where fallen trees have created openings in the forest canopy. This multi-level canopy provides habitat for lichens, mosses, and a wide variety of arboreal plants, amphibians, insects, birds, and small mammals.

Old-growth forests contain large standing snags (dead trees), which provide food and homes for a wide variety of creatures. Large fallen trees help to hold soil in place. As they decompose, these giants also provide moisture and nutrients to the plants and animals that live on the forest floor.

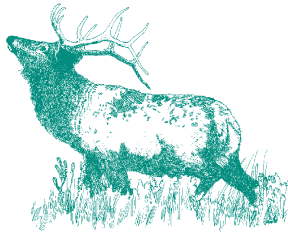
Almost Gone

One hundred and fifty years ago old-growth redwood forests covered two million acres in northwestern California and southwestern Oregon. Today it is estimated that only four percent of the forests remain; 45 percent of those remaining forests are protected within Redwood National and State Parks.



Redwood Forest – Site Locations

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Redwoods are found throughout the parks and throughout the region. However some of the best examples of old growth are found within the California State Park system: at Humboldt Redwoods State Park along the Avenue of the Giants and in Prairie Creek and Jedediah Smith Redwoods State Park units in Redwoods National and State Parks.

PRAIRIE CREEK REDWOODS STATE PARK:

Along Newton B. Drury Scenic Parkway, seven miles north of Orick. A 70-mile trail system with predominately old-growth redwoods starts at Prairie Creek Visitor Center. Adjacent to the visitor center is Elk Prairie, surrounded by redwoods and home to Roosevelt elk. Camping, restrooms, picnic tables. Park along the Parkway or at picnic area.

Along the Parkway are several large turnouts at trailheads and trail crossings that provide excellent access for short walks and extended loops. Big Tree Wayside has ample off road parking and restrooms and is the destination for several short loop trails from the Prairie Creek Visitor Center.

JEDEDIAH SMITH REDWOODS STATE PARK:

Along Highway 199, 10 miles north of Crescent City. Howland Hill Road and Stout Grove offer some of the best old-growth redwood access in the north end of the parks. Hiking trails parallel the road and a summer footbridge connects Stout Grove with the Jedediah Smith Visitor Center and campground. Parking for buses is best across Highway 199 at the Hiouchi Information Center, where exhibits can also be found. Between Crescent City and Hiouchi on Highway 199 is Simpson Reed Grove, a barrier-free trail that leads into the old growth. Parking is limited so please check into parking prior to your trip.

DEL NORTE COAST REDWOODS STATE PARK:

Six miles south of Crescent City. This state park has excellent scenic vistas of old-growth redwood forests while driving Highway 101; limited parking at pullouts.

ELK MEADOW DAY USE AREA:

Off Davison Road three miles north of Orick. Trillium Falls Trail passes through outstanding old-growth groves. Restroom, picnic tables, and bus parking.

LOST MAN CREEK TRAIL:

Off Highway 101 three miles north of Orick, follow the dirt road to the trailhead. This trail passes through one of the largest contiguous old-growth forests in the parks and is the World Heritage dedication site. Restroom, picnic tables, ample parking.

LADY BIRD JOHNSON GROVE:

Two and one-half miles up Bald Hills Road from Highway 101. An easy one-mile loop, this trail differs from others because it is ridgetop forest. Brochures available at the trailhead provide information about the significant features of the area. Restrooms, picnic tables, bus parking.

Redwood Forest – Plants and Animals

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Plant associations are endemic to the northwest coastal forest or the redwood belt, but none are endemic only to redwood forests per se, perhaps because redwoods are still “on the move” since the last glacial episode. Sitka spruce is most likely a relic species having a much wider distribution during cooler climate periods.



The health of redwood forests may well be tied to the California red tree vole. Hard to find, it eats and distributes a spore of endomycorrihea fungi that has a mutualistic bond to redwood root tips.

The wandering salamander can be found on fern mats 130 feet above ground level. Outside of the New World tropics it is the only salamander known to use the forest canopy.

There are 24 species of slugs found in the redwood zone. Most slugs evolved from snails and lost their shells from decreasing amounts of calcium and abundant moisture in their surroundings.

Common Name

Scientific Name

*Status

Plants

Big-leaf maple	<i>Acer macrophyllum</i>	
❖ Coast redwood	<i>Sequoia sempervirens</i>	
Douglas-fir	<i>Pseudotsuga menziesii</i>	
Red alder	<i>Alnus rubra</i>	
Sitka spruce	<i>Picea sitchensis</i>	
Tanoak	<i>Lithocarpus densiflorus</i>	
Western hemlock	<i>Tsuga heterophylla</i>	

Mammals

Black bear	<i>Ursus americanus</i>	
Black-tailed deer	<i>Odocoileus hemionus</i>	
Chickaree	<i>Tamiasciurus douglasi</i>	
Marten	<i>Martes americana humboldtensis</i>	
Mountain lion	<i>Puma concolor</i>	
❖ Northern flying squirrel	<i>Glaucomys sabrinus</i>	
❖ Red tree vole	<i>Arborimus pomo</i>	
Roosevelt elk	<i>Cervus elaphus roosevelti</i>	

Birds

❖ Marbled murrelet	<i>Brachyramphus marmoratus</i>	T
❖ Spotted owl	<i>Strix occidentalis</i>	T
Steller’s jay	<i>Cyanocitta stelleri</i>	
Varied thrush	<i>Ixoreus naevius</i>	
Winter wren	<i>Troglodytes troglodytes</i>	

Amphibians

❖ California slender salamander	<i>Batrachoseps attenuatus</i>	
❖ Wandering salamander	<i>Aneides vagrans</i>	
❖ Del Norte salamander	<i>Plethodon elongatus</i>	
❖ Northern red-legged frog	<i>Rana aurora aurora</i>	
❖ Pacific giant salamander	<i>Dicamptodon tenebrosus</i>	
Pacific tree frog	<i>Pseudacris regilla</i>	
Rough-skinned newt	<i>Taricha granulosa</i>	

Invertebrates

Almond scented millipedes	<i>Harpaphe haydeniana haydeniana</i>	
❖ Banana slug	<i>Ariolimax columbianus</i>	

❖ Indicator species - species more commonly associated with a certain habitat.

* Federal Status: E - endangered, T - threatened, C - candidate, S - sensitive

Redwood Forest – Vocabulary

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Arboreal

pertaining to creatures or plants inhabiting the forest

Burl

a cluster of stem buds (as small as a BB or as large as a coffee table)

Climax forest

stable ecosystem as the end product of succession over time

Detritivores

organisms such as millipedes and banana slugs that feed on dead organic matter

Endomycorrhizal fungi

fungi external to the plant that attach to roots and aid in transport of minerals, water, and nitrogen to the plant

Endemic

specific to or native to a locality

Forest community

assemblage of plants and animals living in a forest type

Forest ecosystem

interrelationships and cycling within a forest type

Fungi

decomposers, unique organisms that are neither plant nor animal



Mediterranean climate

a maritime climate characterized by dry, warm summers and cool, wet winters

Mutualism

a beneficial association between different kinds of organisms

Old-growth forest

generally accepted to be forest pre-dating Euro-American settlement of the West

Tannin

chemicals produced by plants to protect from insect and disease infestation

Transpiration

release of water vapor from plants into the atmosphere via stomata

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Coastal Strand

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Have you heard the redwood region slogan, “Where the Redwoods meet the sea?” Redwood trees growing at ocean’s edge are the exception, not the rule. Between the ocean’s edge and the redwoods is a lush, wind-tossed environment called the coastal strand. Found within the coastal strand are a diversity of habitats: beaches, ponds, lagoons, coastal scrub, estuaries, and prairies, as well as forests.

The easiest way to explore the coastal strand is to travel along Highway 101 from Crescent City, CA to Freshwater Spit Lagoon, four miles south of Orick, CA. Here, you will encounter all that the coastal strand has to offer. Be sure to use turnouts when the line of traffic gets long behind you.

Rooting in the Sand

On the beaches, few plants survive in any numbers on the constantly shifting sand. Many beach plants have developed deep taproots and stout stems that can withstand being exposed or buried by blowing sand. The broad, succulent leaves of sand verbena and beach strawberry help trap the sand and keep the sand in place. The creeping, underground stems of beach pea and other members of the pea family, hold the plant securely in place on the sand. A threat to the native beach vegetation is European beachgrass, an

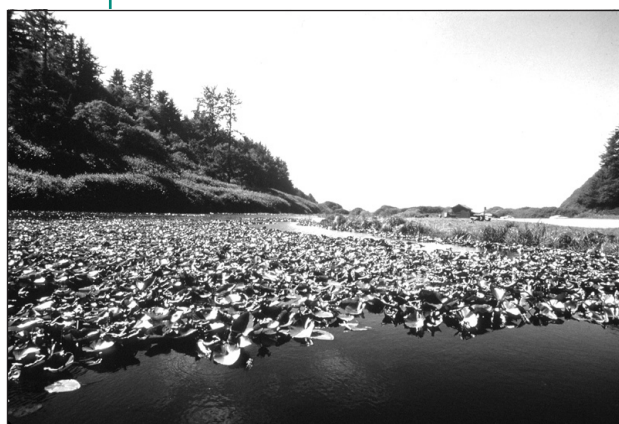
introduced plant. Its dense, expanding mat of grass and roots crowd out native plants. Removal of European beachgrass has taken place at Freshwater Lagoon Spit and is in progress at other beach locations along the North Coast. Native plants quickly recover without seeding once beachgrass is removed.

As you walk towards the ocean look for the area where land plants stop and marine plants begin. On the way, investigate the sand for other signs of life. Be on the lookout for tracks, live and dead animals, seaweed, shells, and sand fleas. If you dig a little in the sand you may find other inhabitants, such as sand crabs and worms.

Mill Pond?

Scattered throughout the coastal strand are shallow ponds. Some, such as Lagoon Creek, are former mill ponds that were once filled with logs destined for the lumber mills. Over time, these former mill ponds have become habitats for a wide variety of native plants and animals.

Other ponds are naturally formed through a variety of geologic processes. In the ponds you will find plants and animals that thrive on land and in the water: migratory birds, native snakes, bats, fish, and invertebrates are all found here. As plants and animals living in and near the pond die and slowly decay, they form a soggy, muddy



bottom. Walking in these shallow ponds is almost impossible, one step in and you might find your boot sucked off your foot when you try to step out!

Shifting Lagoons

Found along Highway 101 south of Orick and continuing south through



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Humboldt County are brackish water lagoons. Formed by longshore currents and northwest winds in the spring and summer, they appear as small lakes dotted among coastal beaches. Most of the lagoons in the parks have been stabilized over time by human activities and vegetation growth. It is common to find trees lining one side of a lagoon and a beach on the other.

Some lagoons are opened up by strong ocean waves and winter storms. When a lagoon is breached, freshwater from the lagoon empties into the ocean and the ocean water washes in to the lagoon and sits on top of the freshwater, like oil and vinegar salad dressing. Some lagoons have dropped up to 10 feet in one emptying, leaving the lagoon with only a third of its water remaining. Plants and animals found at ponds can also be found in and near the lagoons.

Wet and Wild Nurseries

A number of rivers flow through the coastal strand and out to the Pacific Ocean. At the mouth of the rivers, nutrient-rich, shallow areas form the estuaries. Here, salmon, steelhead trout, and other anadromous fish await their transformation to survive salt-water living. Estuaries also serve

as nurseries for young fish and invertebrates and are important feeding areas for migratory birds.

Coastal Vegetation

The vegetation type that most describes the coastal strand is coastal shrub. Beyond the sandy ocean beaches, ponds, and lagoons you can find many plants anchored in the rich soil. On the sometimes-steep hills and cliffs next to the ocean, wind sculpts shrubs and trees into strange shapes.

Many native and non-native plants of all sizes—ranging from grasses, vines, shrubs, and trees—that can withstand full exposure to sun, fog, wind, and winter storms thrive here. Gophers, rabbits, deer, elk, mountain lions, bears, and humans inhabit or venture through this area.

There are a few prairies remaining within the coastal strand where historically the vegetation was opened up to grasslands. Non-native blackberry brambles have encroached upon many of the native grassy coastal prairies. For more in-depth information on prairies in Redwood National and State Parks, read the prairie section in this booklet.

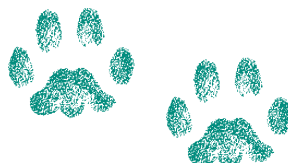
Competing Forests

The forests of the coastal strand are different from those of the coast redwood forest. In the redwoods, every tree seems to have its own space (true cooperation). The coastal forest, on the other hand, is a forest of great competition among an abundant number of plants.

Evergreen Sitka spruce and Douglas-fir dominate the forest canopy. The wider deciduous foliage of red alder, cascara, and willow seems to magically appear in the spring and summer, giving shade relief to evergreen saplings.

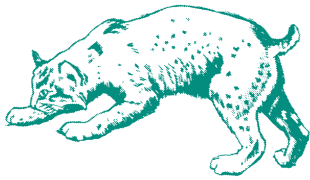
Trees in this area form a buffer zone, protecting the coast redwood from the effects of salt spray and wind. Offshore winds blow salt air onshore and at times the ocean scent can be detected several miles inland.

The forest understory seasonally offers an assortment of berries, seemingly every size and shape, that provide food for wildlife from early spring to late fall. Grasses and wildflowers are also found here. It seems that there is always something in bloom in this region throughout the year.



Coastal Strand – Site Locations

Resource Fact Sheet



Please use the park map and guide to help find these locations, listed north to south.

They have been chosen due to bus parking, diversity, and beauty. We recommend that a teacher visit a location before taking a group there. Everyone should dress appropriately for weather and bring personal water bottles (most sites don't have water).

When visiting any coastal strand area, please leave only footprints and take only photographs and memories.

TOLOWA DUNES STATE PARK:

Follow Highway 101 into Crescent City, turn northwest onto Northcrest Drive, which turns into Lake Earl Drive. Three locations are available from Lake Earl Drive: (1) Turn west onto Old Mill Road. Drive 1½ miles to the end. Bus parking, no restroom, 4-mile loop trail to Lake Earl, (2) Turn west onto Lower Lake Road to Kellogg Road. Park at horse trailhead. Bathroom 1/8 mile in at primitive campsites, (3) Turn west onto Lower Lake Road and drive to Pala Road. Bathroom, bus parking, trail to Yontocket.

CRESCENT BEACH:

Three miles south of Crescent City, turn right onto Enderts Beach Road, continue ½ mile. Restrooms, picnic tables, fire pits, bus parking.

CRESCENT BEACH OVERLOOK:

Three miles south of Crescent City, turn onto Enderts Beach Road and drive 1½ miles to the end. Picnic tables, viewing platform, parking, no restroom.

ENDERTS BEACH/LAST CHANCE SECTION, COASTAL TRAIL:

Three miles south of Crescent City, turn west onto Enderts Beach Road and drive 1½ miles to the end. This trail is dangerous for young children due to steep cliffs and erosion. The only restroom is at Nickel Creek primitive camp, about ½ mile from the parking lot. Large busses may have trouble maneuvering the turn around. Beware of ticks (in the grasses) and poison oak.

DEMARTIN SECTION, COASTAL TRAIL:

Park at the south end of the trail located at the Redwood Hostel (12 miles south of Crescent City). Hike through Wilson Creek canyon to coastal prairie habitat and then into old-growth forest. Six miles one way. Restroom located at DeMartin primitive camp, half way in.

LAGOON CREEK DAY USE AREA:

On Highway 101, 12½ miles south of Crescent City. Habitat type: cobble beach with tidepools. 1½-mile loop trail to Hidden Beach or ½ mile to Wilson Creek. Mill pond and Yurok Loop Trail also available. The 1-mile Yurok Loop is a gentle climb to ocean vistas and loops through red alders. Seastacks support thousands of nesting seabirds in the spring. Restrooms, picnic tables, bus parking.

REDWOOD CREEK ESTUARY/FRESHWATER LAGOON:

Located one mile south of Orick at Redwood Information Center (please call 707-464-6101 x5265 to arrange to have your class view a movie at the center). The spit at Freshwater Lagoon is situated along Highway 101 on the beach side; the lagoon is on the east side. Ample parking at all three locations. Restrooms at Redwood Information Center.

Coastal Strand – Plants and Animals

Resource Fact Sheet



Common Name	Scientific Name	*Status
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Plants

Angelica	<i>Angelica hendersonii</i>	
❖ Beach layia	<i>Layia carnosa</i>	E
Beach strawberry	<i>Fragaria chiloensis</i>	
Coyote brush	<i>Baccaris pilularis</i>	
❖ Sitka spruce	<i>Picea sitchensis</i>	
Yellow pond lily	<i>Naphar polysepalum</i>	

Mammals

Beaver	<i>Castor canadensis</i>	
Bobcat	<i>Felis rufus</i>	
Brush rabbit	<i>Sylvilagus bachmani</i>	
Little brown bat	<i>Myotis lucifugus</i>	
River otter	<i>Lutra canadensis</i>	
Roosevelt elk	<i>Cervus elaphus roosevelti</i>	

Birds

Aleutian cackling goose	<i>Branta canadensis leucopareia</i>	
❖ Brown pelican	<i>Pelecanus occidentalis californicus</i>	E
❖ Marsh wren	<i>Cistothorus palustris</i>	
Northern flicker	<i>Colaptes auratus</i>	
Red-tailed hawk	<i>Buteo jamaicensis</i>	
❖ Wrentit	<i>Chamaea fasciata</i>	

Reptiles and Amphibians

❖ Del Norte salamander	<i>Plethodon elongatus</i>	
Pacific giant salamander	<i>Dicamptodon enstatus</i>	
Northern red-legged frog	<i>Rana aurora aurora</i>	
Rough-skinned newt	<i>Taricha granulosa</i>	

Fish

Chinook salmon	<i>Oncorhynchus tshawytscha</i>	T
Coastal cutthroat trout	<i>Oncorhynchus clarki</i>	
Coho salmon	<i>Oncorhynchus kisutch</i>	T
Steelhead	<i>Oncorhynchus mykiss</i>	T

Invertebrates

Dragonfly (common green darter)	<i>Anax junius</i>	
❖ Oregon silverspot butterfly	<i>Speyeria zerene hippolyta</i>	T

❖ Indicator species - species more commonly associated with a certain habitat.

* Federal Status: E - endangered, T - threatened, C - candidate, S - sensitive

Coastal Strand – Vocabulary

Resource Fact Sheet



Anadromous:

fish that hatch in freshwater streams, migrate to the ocean as adults, and return to the freshwater streams to spawn

Beaches:

the shore of a body of water, especially when sandy or pebbly

Brackish water lagoons:

a lagoon that has some salt mixed with fresh water

Buffer zone:

a zone or strip of land that lessens or absorbs the shock of possible adverse pressures or influences (such as storms or salt spray from the ocean)

Coastal scrub:

low growing shrubby plants that are located near or on the coast

Coastal strand:

term given to the land bordering the seashore; within this zone you can find several diverse habitats that form the whole of the coastal strand. In Redwood National and State Parks, the area between the ocean and the coast redwood forest.

Deciduous:

shedding foliage at the end of the growing season

Estuaries:

the part of the mouth of a river where its current is met by the ocean

Forest:

a dense growth of trees, together with other plants, covering a large area

Evergreen:

having foliage that remains green year round

Invertebrates:

a group of animals without backbones, e.g. slugs, aquatic and land insects, and spiders

Lagoon:

a shallow body of water separated from the sea by sandbars

Longshore current:

a steady and smooth onward movement of water occurring along a seacoast

Pond:

a still body of fresh water smaller than a lake (wetland)

Succulent:

a plant that has thick fleshy leaves or stems that conserve moisture

Understory:

the foliage layer lying beneath and shaded by the main canopy of a forest

Coastal Strand – References

Resource Fact Sheet



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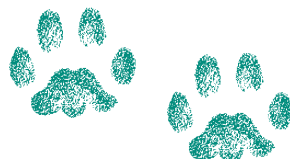
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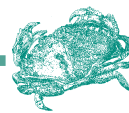
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Near-shore Marine

Resource Fact Sheet



Underlying Geologic Forces

Life between the Pacific's tides at Redwood National and State Parks is greatly influenced by the underlying geologic forces that have formed this dynamic, irregular coastline. The parks' 37 miles of coastline include a variety of coastal habitats—from protected sandy shores to exposed vertical rock surfaces. The diversity of plant and animal life in these temperate intertidal areas is equal to all the marine life found in the entire Pacific Ocean.

Much of what is visible from shore is a direct result of the Cascadia Subduction Zone. As two tectonic plates slowly collide between 30 and 60 miles offshore, the Gorda Plate (under the ocean) is thrust below the North American Plate, and the coast is uplifted and deformed. Accretion has also occurred as sediment is scraped off the submerging ocean plate and plastered onto the overriding continental plate. These sediments are what make up the Franciscan formation.

The Franciscan Influence

The Franciscan formation is composed of igneous, metamorphic, and sedimentary rocks. The spectacular cliffs above Enderts Beach at the north end of the parks are Franciscan sandstone. Within the sandstone are smaller layers of mudstone and siltstone, which are finer grained sedimentary rocks. The sandstone cliffs are very unstable as demonstrated by the amount of fallen rocks accumulated at the base.

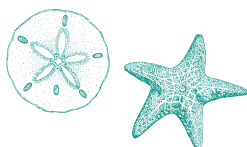
The seastacks visible at Enderts Beach and along the parks' coastline are not fallen rocks. They are what's left after the other materials have eroded away. As wave energy eroded the sandstones and mudstones, the stronger rocks—made of durable greenstone and chert—were left standing.

Wave Action/Intertidal Zones

The cool, rocky coastal areas generally have a large intertidal zone with a diversity of life forms. Wave action provides the plants and animals with a continual supply of ocean water. The rocks form tidepools that provide places for plants and animals to attach. Tidepool life is divided into four zones based on the plants' and animals' adaptability to wet and dry conditions. These four zones from

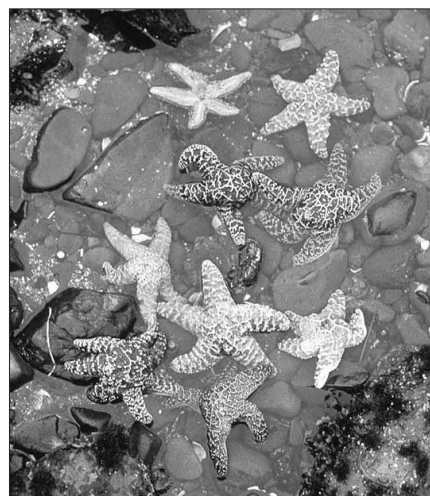


highest to lowest are (1) splash zone, (2) high tide zone, (3) mid-tide zone, and (4) low tide zone. Tidepools along the northern Pacific are exposed twice each day at low tide.



Marine Terraces – Sandy Life

Crescent Beach is a marine terrace, formed underwater by marine sediment deposition then uplifted as the tectonic plates collided. The Franciscan formation lies below the sand. Although sandy beaches do not have the diversity of life that is exhibited in tidepools,



many animals and some plants can be found on and below the surface of the sand.

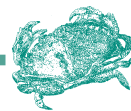
The rocky and sandy shore environments within the parks are fragile homes to exceptional plants and animals. These environments, though individually different, have many characteristics in common. The kind and number of organisms found in each depend on the type of environment, the force of the waves in that area, the length of exposure to the air and drying, and the presence or absence of other organisms for food.

Physical Elements Common to Sandy and Rocky Environments

Sand – Comes from two sources: (1) brought from inland by rivers flowing into the ocean and

Near-shore Marine

Resource Fact Sheet



tossed onto the beach by waves and (2) ground up coastal rock.

Rock – Comprised of minute grains of sand, larger cobbles, boulders, cliffs, or small isolated offshore rock islands called seastacks.

Land/water interface – On sandy beaches this can be gently sloping or abrupt with crashing surf and dangerous currents, depending on the time of year. Rocky shores can be low and cobbly with extensive exposed areas during low tide or have high rocks and large boulders with limited exposure during tidal changes. The land/water interface is most visible on vertical rocky surfaces, where the plants and animals are naturally divided into the four tide zones. Sandy beaches also exhibit zonation (a high, middle, and low beach), each zone with its respective diversity of life forms.

Tides – Tides are caused by the gravitational pull of the sun and the moon on the waters of the earth. There are two high and two low tides approximately every 24 hours. Because of factors, such as the shape of the coast and the size of the Pacific Ocean, these four daily tides are all different heights.

Tide height is determined from the mean (average height) of the lower of the two low tides in an area. This mean is assigned as the “0” level. Tide heights are then measured as the number of vertical feet above (“plus” tides) or below (“minus” tides) the mean. Tide

height variances also change with times of the year as the earth, moon, and sun are in different positions relative to each other. The best times for exploring intertidal areas are during the daily low tides and for tidepools during the “minus” tides, which cycle monthly. Tides are second only to waves in creating the shape of a coast.

Waves – Waves are caused primarily by wind blowing over the surface of the ocean and can change in size and direction hourly. Wave size and the effect of wave action varies with weather, the shape of the shoreline, the slope of the sea bottom, area protection, and shore composition, among other factors.

Waves are the primary mover of sand and rocks. Strong waves, normally present during stormy winter months, and the lack of strong waves during summer months, can dramatically affect beaches and their associated plant and animal communities. Here, summer surf typically builds up beaches and winter waves scour sand and rocks away.

Currents – The Pacific Ocean contains almost half of the earth’s salt water. The North Pacific current and California current are part of a great planetary flow of water pushed by winds around the North Pacific basin. These currents pull life-sustaining nutrients from ocean depths to the surface. Currents mix ocean nutrients with those washed into the oceans from land; as a result, coastal waters are always

richer in nutrients and are more productive than the open ocean. Due to this constant replenishing, plants flourish, animals prosper from plants’ richness, and smaller animals serve as food for larger predators.

Fragile When Exposed

Although these environments seem tough and support large numbers of living things in harsh conditions, they are extremely fragile areas. These are total ecological units, isolated and self-contained. The plants and animals are generally protected when covered with water, but are vulnerable when the tide goes out, lying exposed to sun and wind.

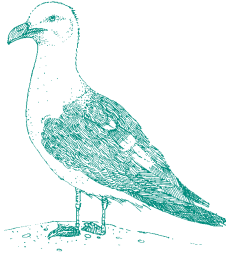
Many animals in the intertidal zones are long-lived but easily destroyed. Humans are intruders in a very delicately balanced environment. The easiest way to ensure this balance continues is to observe the following:

- ☀ All plants and animals in the parks are protected by law. Collecting is not permitted.
- ☀ If you pick up a rock or animal, put it back the way it was found and in the same location.
- ☀ Tread lightly. Space is a premium commodity; living organisms will inhabit nearly every exposed surface.
- ☀ Protect yourself – move slowly, pick your footing carefully, and **never** turn your back to the ocean. Explore facing the ocean. Listen for changes in sounds. If caught by a sneaker wave, don’t run; crouch low and become “one” with the sea stars and limpets.



Near-shore Marine – Site Locations

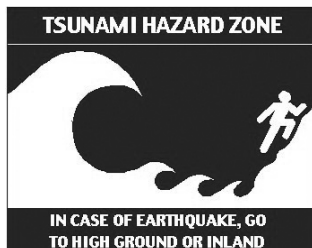
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If you feel a strong earthquake on the coast, a tsunami may follow.

To escape a tsunami:

(1) Protect yourself during the earthquake. Watch for falling objects, including trees and rocks, (2) Leave the beach as soon as you are able. A tsunami may be coming, (3) Move inland and uphill quickly, and (4) Do not return to the beach until an official all-clear has been issued. More waves may be coming.



CRESCENT BEACH PICNIC AREA:

Three miles south of Crescent City, turn right onto Enderts Beach Road, continue ½ mile. Habitat type: sandy beach. Marsh community also available. Restrooms, picnic tables, fire pits, bus parking, no water.

ENDERTS BEACH/LAST CHANCE SECTION, COASTAL TRAIL:

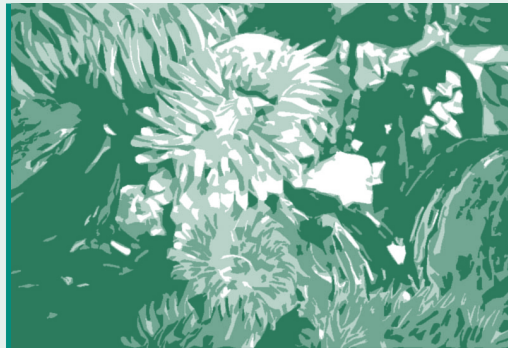
Three miles south of Crescent City, turn onto Enderts Beach Road, continue 1½ miles to the end. Habitat type: sandy beach, rocky cove, tidepools, seaweeds. Restroom along trail, ½ mile to beach, another ¼ mile to tidepools. Steep trail. Not recommended for young students due to unprotected cliffs.

WILSON CREEK (FALSE KLAMATH COVE):

Twelve miles south of Crescent City, directly off Highway 101. Habitat type: sandy beach, low rocky beach with tidepools. Picnic tables, small parking area, restroom at Lagoon Creek (see below).

LAGOON CREEK/HIDDEN BEACH:

On Highway 101, 12½ miles south of Crescent City. Habitat type: cobble beach with tidepools. 1½-mile loop trail to Hidden Beach or ½ mile to Wilson Creek (see above). Mill pond and Yurok Loop Trail (1 mile) also available. Restrooms, picnic tables, bus parking.



GOLD BLUFFS BEACH:

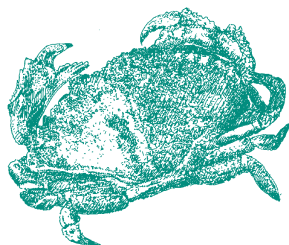
Eighteen miles south of Klamath or three miles north of Orick, turn onto Davison Road, six miles (mostly dirt, gravel road) to the beach. Habitat type: sandy beach with high bluffs. Fern Canyon nearby. Picnic tables, fire pits, restrooms, ample parking. Vehicles over 24 feet prohibited on Davison Road.

REDWOOD CREEK PICNIC AREA:

On Highway 101 one mile south of Orick. Habitat type: sandy beach. Redwood Information Center and wetland boardwalk within walking distance. Restrooms, picnic tables, bus parking.

Near-shore Marine – Plants and Animals

Resource Fact Sheet



Common Name	Scientific Name	*Status
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Sand Beaches - Animals

Beach flea	<i>Orchestoidea californiana</i>	
Mole crab	<i>Emerita alaloga</i>	
Razor clam	<i>Siliqua patula</i>	
Sand dollar	<i>Dendraster excentricus</i>	

Rocky Beach/Tidepools - Plants

Feather boa	<i>Egria menziesii</i>	
Sea lettuce	<i>Ulva latuca</i>	
Sea palm	<i>Postelsia palmaeformis</i>	
Tufted red algae	<i>Endocladia muricata</i>	

Animals

Acorn barnacle	<i>Balanus glandula</i>	
Bat sea star	<i>Patiria miniata</i>	
California mussel	<i>Mytilus californianus</i>	
Clam	<i>Protothaca staminea</i>	
Giant green anemone	<i>Anthopleura xanthogrammica</i>	
Gumboot chiton	<i>Cryptochiton stelleri</i>	
Hermit crab	<i>Pagurus spp.</i>	
Jellyfish	<i>Aurella aurita</i>	
Keyhole limpet	<i>Diodora aspera</i>	
Nudibranch	<i>Hermisenda crassicornis</i>	
Ochre sea star	<i>Pisaster ochraceus</i>	
Rock crab	<i>Cancer antennarius</i>	
Rock louse	<i>Ligia pallasii</i>	
Sculpin	<i>Oligocottus snyderi</i>	
Sea cucumber	<i>Eupentacta quinquesemita</i>	
Sea urchin	<i>Strongylocentrotus purpuratus</i>	
Sunflower sea star	<i>Pycnopodia helianthoides</i>	
Turban snail	<i>Tegula funebris</i>	

Near-shore Waters - Plants

Giant kelp	<i>Nereocystis leutkeana</i>	
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Animals

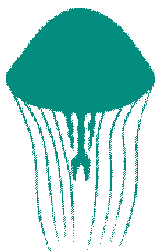
Brown pelican	<i>Pelecanus occidentalis</i>	E
California sea lion	<i>Zalophus californianus</i>	
Black oystercatcher	<i>Haematopus bachmani</i>	
Western gull	<i>Larus occidentalis</i>	

❖ Indicator species - species more commonly associated with a certain habitat.

* Federal Status: E - endangered, T - threatened, C - candidate, S - sensitive

Near-shore Marine – Vocabulary

Resource Fact Sheet



Algae:	unicellular or multi-cellular simple plants that have no vascular tissue and therefore no leaf, stem, or root
Arthropod:	any member of the phylum Arthropoda; invertebrate animals characterized by jointed legs, a segmented body, and an exoskeleton of chitin; includes crustaceans and insect
Coelenterate:	any member of the phylum Coelenterata, which are radially symmetrical and have hollow, sack-like bodies; includes jellyfish, hydroids, anemones
Echinoderm:	any member of the phylum Echinodermata, “spiny skin” invertebrate animals; includes sea stars, sea urchins, sand dollars, and sea cucumbers
Franciscan formation:	an assemblage of dinosaur-age rocks derived from ancient marine sediments which have been pushed against the western edge of North America
Gastropod:	any mollusk of the class Gastropoda (stomach foot); includes snails, limpets, and nudibranchs
Intertidal zone:	the zone along the shore between the high and low tide marks; also called the littoral zone
Isopod:	any member of the order Isopoda (equal-foot), crustaceans that include pill bugs and rock lice
Mollusk:	any member of the phylum Mollusca (soft body); includes clams, mussels, snails, and limpets
Seastack:	a large rock originally part of the mainland but now isolated from it by water erosion
Tectonic plates:	the sections of the earth’s rigid crust that float on the earth’s mantle
Tidepool:	a depression in a rock (or created by rocks) in the intertidal zone that traps water as the tide recedes
Zones, Zonation:	banded distribution of plants and animals, resulting from repeated submergence/emergence of land along the shore; best seen on vertical smooth rock surfaces. Splash zone: wet only by the highest waves during the highest tides; high tide zone: covered during most high tides; mid-tide zone: covered except during some low tides, and has permanent deep tidepools; low tide zone: exposed only during the lowest low tides, and has the greatest variety of intertidal life.

Near-shore Marine – References

Resource Fact Sheet



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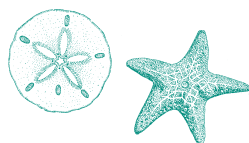
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Stream/Riparian

Resource Fact Sheet



Three major watersheds—the Smith River, the Klamath River, and Redwood Creek, and their associated streams—drain Redwood National and State Parks' land. These waterways and the riparian habitats along their banks provide homes to a variety of plants and animals.

Glacial Influence

The aquatic life within Pacific Northwest coastal streams was influenced by a series of as many as 30 glacial advances and retreats that occurred during the last two-to-three million years. Each advance pushed freshwater aquatic organisms out of their habitat and into the saltwater oceans. With each glacial retreat the surviving aquatic stream members swam, flew, or crawled back up coastal streams as far as they could travel. With the exception of two species of suckers and five species of minnows, all the native fish of the redwood coastal streams have retained the ability to live in salt water.

This is no small achievement, requiring a drastic reengineering of the fishes' internal organs and fluids. Perhaps these fish (salmon, trout, lamprey, sturgeon, eulachon, stickleback, and sculpin) are preserving their ability to live in saline water through the current interglacial period in anticipation of the next glacial advance.

They are adapted for cold, clear, oxygen-rich water. They need a stream channel that includes riffles, deep pools, large fallen trees, and clean gravels. Many are very intolerant to changes in water temperature, water quality, and stream structure.

A Rare/Sensitive Community

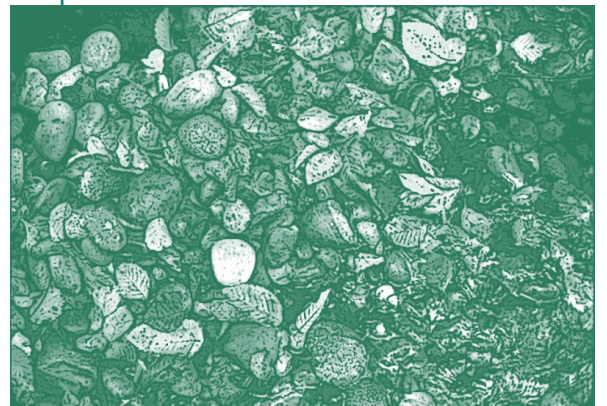
Aquatic ecosystems are the most sensitive type of natural community within the redwood region and unfortunately, they are the most degraded. Species diversity and numbers are affected by small changes in sediment load, water temperature, dissolved oxygen, and streambed structure. Indeed, aquatic insects and amphibians are used worldwide as indicators of stream health.

Many life-supporting materials (minerals, nutrients, and oxygen) enter the stream in the headwaters and are transported downstream to the estuaries near the stream's mouth.

As water moves materials downstream, nutrients, sediment, and pollutants that entered at the headwaters are extracted by in-stream aquatic life and terrestrial animals in the riparian (streamside) areas.

The Stream Continuum

Watersheds are made up of streams of various sizes. Smaller headwater streams, such as Elam and Bond Creeks, begin at the ridgetops where they are generally from 1½ to 10 feet wide. The primary food producers (plants) in headwater streams have broad leaves and



needles that fall in the stream from riparian vegetation. Mosses also provide some in-stream production (food resources). Macroinvertebrates and amphibians dominate aquatic life. Shredders such as stoneflies and collectors like mayflies process riparian litter and its residue. There is a substantial amount of large woody debris in the stream.



Stream/Riparian

Resource Fact Sheet



Intermediate streams such as Prairie Creek, Lost Man Creek, and Mill Creek are generally 10 to 35 feet wide. Primary producers include in-stream algae and mosses. Macroinvertebrate aquatic life includes grazers such as caddisflies and filter-feeding collectors such as mayflies. Dominant predators are amphibians and salmonids.

Large streams include Redwood Creek flowing from outside the southern park boundary into the Pacific Ocean near Orick; the Smith River, the largest free-flowing river in northern California—which flows from the north through Jedediah Smith Redwoods State Park; and the Klamath River which flows from its headwaters in Oregon through the Siskiyou mountains and into the central part of the park. These streams are more than 100 feet wide. Primary producers in the stream include algae, moss, and aquatic plants. Filter-feeding collectors dominate macroinvertebrate aquatic life and the dominant predators are salmon and trout, and terrestrial mammals and birds.

Healthy Contributors

Various conditions contribute to the health of these streams. As headwater streams flow through riffles and small waterfalls, bubbles of atmospheric oxygen become mixed into the water. Some of this oxygen is dissolved in the water and is available to aquatic life.

A series of pools and riffles are essential to a healthy stream. When large trees fall into the

stream, water flowing over and around their trunks scours out pools in the streambed. Salmon and trout utilize these pools as rearing habitat and woody debris provides cover from predators. Salmonids need clean, medium-sized gravel to build their nests (redds). If the space between the gravel is open—rather than filled with fine sediment—more water can flow through, providing adequate oxygen for salmonid eggs and aquatic insects.

Cold water is essential to stream life, holding more oxygen than warm water. Headwater streams provide cold water to downstream life. Historically, coastal riparian habitat contained towering streamside trees that shaded the stream from solar radiation. Where large sections of the stream are now directly exposed to sunlight, water temperature rises and can affect the growth and health of and salmon and other cold water species.

Intricate Nutrient Cycle

An intricate nutrient cycle exists between the riparian areas along the riverbanks and streams, their estuaries, and the ocean. The cold stream water is relatively poor in nutrients. Juvenile fish migrate to the brackish estuaries in preparation for their journey to the ocean. In the estuary, nutrients wash in from both the ocean and upstream headwaters. Juvenile fish then migrate to the ocean to feed in the nutrient-rich seawater, returning as adults to the streams to spawn and then die. Their nutrients cycle

back through terrestrial animals, fish, other aquatic animals, and riparian vegetation. Aquatic insects feed on the decomposing bodies of the spawners, and those insects in turn are food for the juvenile fish that hatch in the streams. These adult fish also provide food for terrestrial animals such as black bears, raccoons, otters, eagles, and osprey. The animal wastes fertilize the riparian zones along streams. Plants in the riparian zone—coast redwood, Douglas-fir, alder, willow, big-leaf maple, vine maple, and myrtlewood—then recycle nutrients back to the streams through leaf fall.

Removing Logging Roads

Streams within Redwood National and State Parks, especially Redwood Creek and the Klamath River, have been heavily impacted by logging and farming within their watersheds. The removal of forests on steep hillsides increases the impacts from large storm events, which can wash large quantities of silt, sand, and gravel into the streams. Excess sediment in streams can fill in pools, widen stream channels, cause poor gravel quality, and degrade fish habitat. Removal of trees along riverbanks increases water temperatures by eliminating shade and decreases the availability of large trees to fall into the streams and form pool habitat.

A park management priority is to remove old logging roads within the park and to recontour the road cuts to their original shape. This reduces the amount of sediment washed into the streams during large floods.



Stream/Riparian – Site Locations

Resource Fact Sheet



By using park roads and trails that parallel streams, students are able to follow the change in a stream's community from its headwater to its mouth.

PRAIRIE CREEK TRAIL:

Begins at the Prairie Creek Visitor Center, along Newton B. Drury Scenic Parkway, two mile loop. Good place to observe a clean stream and winter salmon runs. Restrooms, picnic tables. Park at visitor center or picnic area.

LOST MAN CREEK TRAIL:

Off Highway 101 three miles north of Orick, follow the dirt road to the trailhead. Walk one mile, one way. Good place to observe a clean stream and winter salmon runs. Restrooms, picnic tables, ample parking.

REDWOOD CREEK ESTUARY:

At Kuchel Visitor Center, located one mile south of Orick. Redwood Creek can also be accessed by walking one mile from the Redwood Creek trailhead located one-half mile off Bald Hills Road. Redwood Creek has been heavily impacted by logging and flood events that have washed enough gravel into the streambed to raise it over eight feet above its historic levels. Restrooms, picnic tables, bus parking.

SMITH RIVER at JEDEDIAH SMITH REDWOODS STATE PARK:

Located along Highway 199, 10 miles north of Crescent City. Trails in Jedediah Smith Redwoods State Park follow the Smith River, a pristine river with an unusual turquoise color created by the serpentine rock it flows over. Bus parking available at the Hiouchi Information Center across from the park. Restrooms, picnic tables, ample parking.

ELK MEADOW DAY USE AREA:

Off Davison Road three miles north of Orick. Wetland (marshy) area that is good to observe a smorgasbord of birds in a variety of shrubby plants and trees. Trillium Falls Trail is a 2½ loop through old-growth redwoods that includes a 10-foot waterfall cascading over rocks covered in deep-green moss. Look for red-legged frogs and Pacific giant salamanders. Restroom, picnic tables, bus parking.

MARSHALL POND/FLINT RIDGE SECTION, COASTAL TRAIL:

Take the Coastal Drive south of Klamath and the Klamath River bridge. Turn left onto Alder Camp Road and park at the Flint Ridge trailhead. Short hike to Marshall Pond, a wetland area where beaver and many water fowl species make their home. Ample parking, no restroom.

LAGOON CREEK:

On Highway 101, 12½ miles south of Crescent City. The lagoon is an old mill pond, taken over by bird and fish species. Restrooms, picnic tables, bus parking.

Stream/Riparian – Plants and Animals

Resource Fact Sheet



Turn over a rock, leaf, or branch in a coastal stream and you will find macroinvertebrates. Some of these insects are very sensitive to changes in water temperature, dissolved oxygen, pollution, and fine sediment.

All amphibians, except the lungless salamander, use the streams as reproduction habitat. Some live near streams all of their lives; others move into the forest as adults.

Common Name	Scientific Name	*Status
Plants		
Big-leaf maple	<i>Acer macrophyllum</i>	
Black cottonwood	<i>Populus trichocarpa</i>	
California bay	<i>Umbellularia californica</i>	
Red alder	<i>Alnus rubra</i>	
Sitka willow	<i>Salix sitchensis</i>	
Vine maple	<i>Acer circinatum</i>	
Mammals		
Black bear	<i>Ursus americanus</i>	
Little brown bat	<i>Myotis lucifugus</i>	
Raccoon	<i>Procyon lotor</i>	
River otter	<i>Lutra canadensis</i>	
Birds		
American dipper	<i>Cinclus mexicanus</i>	
Bald eagle	<i>Haliaeetus leucocephalus</i>	
Belted kingfisher	<i>Ceryle alcyon</i>	
Great blue heron	<i>Ardea herodias</i>	
Osprey	<i>Pandion haliaetus</i>	
Fish		
❖ Chinook salmon	<i>Oncorhynchus tshawytscha</i>	T
❖ Coastal cutthroat trout	<i>Oncorhynchus clarki</i>	C
❖ Coho salmon	<i>Oncorhynchus kisutch</i>	T
Eulachon (candlefish, smelt)	<i>Thaleichthys pacificus</i>	
❖ Steelhead	<i>Oncorhynchus mykiss</i>	T
Amphibians		
❖ Pacific giant salamander	<i>Dicamptodon tenebrosus</i>	
Pacific tree frog	<i>Pseudacris regilla</i>	
Northern red-legged frog	<i>Rana aurora aurora</i>	
❖ Southern torrent salamander	<i>Rhyacotriton variegatus</i>	
❖ Tailed frog	<i>Ascaphus truei</i>	
Macroinvertebrates - many species in the Order		
❖ Caddisfly	<i>Trichoptera</i>	
❖ Mayfly	<i>Ephemeroptera</i>	
❖ Stonefly	<i>Plecoptera</i>	
❖ Indicator species - species more commonly associated with a certain habitat.		
* Federal Status: E - endangered, T - threatened, C - candidate, S - sensitive		

Stream/Riparian – Vocabulary

Resource Fact Sheet



Anadromous:

fish that hatch in freshwater streams, migrate to the ocean as adults, and return to the freshwater streams to spawn (Greek, *ana* = up + *dromos* = race, “an up-running race”)

Headwaters:

point of origin for a watershed or the small streams that make up a river

Larvae:

also called nymph; the young immature stage of insects or other invertebrates

Macroinvertebrates:

organisms that do not have a backbone and are large enough to be seen without a microscope

**Pollution-tolerant,
pollution-sensitive:**

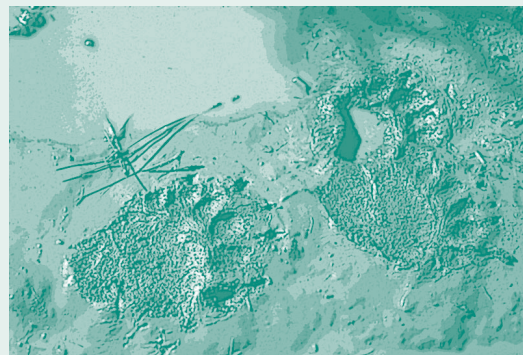
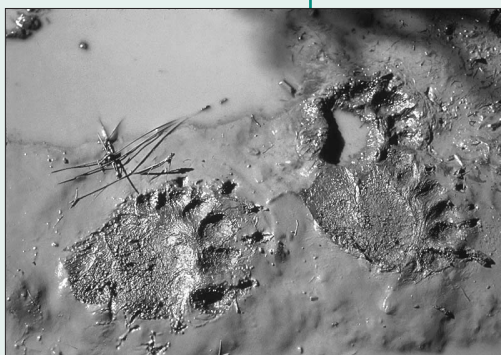
some macroinvertebrates can take (are tolerant) of pollution while others are very intolerant or sensitive to pollution

Pollution:

may be “natural” fine sediment suspended in moving water or human caused, such as automobile oil

Redds:

the nests made by salmonids — where they lay their eggs



Riparian:

area of vegetation along a stream or wetland

Riffle:

a shallow in a stream, producing choppy water due to rocks near the surface

Sediment:

matter that settles to the bottom of a liquid (stream)

Sediment load:

weight or volume of sediment compared to volume of water

Substrate:

subsoil or base on which other soils rest

Vascular plant:

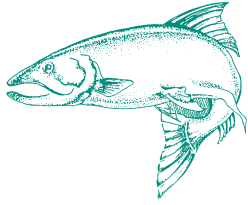
pertaining to the specialized conducting cells, xylem and phloem, that convey water and food in plants

Watershed:

the total area drained by a stream or river system

Stream/Riparian – References

Resource Fact Sheet



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